AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of determining the concavity and convexity on a sample, comprising the steps of:

scanning a portion of a sample including a convex pattern formed thereon with a charged particle beam; and

forming a profile waveform based on a charged particle emitted from a location of said sample that has been the scanned portion of the sample;

detecting a peak in the formed profile waveform;

comparing a convergence of a foot portion of each peak on either side thereof in the detected profile waveform;

determining when the said profile waveform comprising a peak, wherein, when one foot portion on one side of said peak converges more gradually than the other foot portion thereof on the other side, that a portion of said sample corresponding to said one foot portion is determined a non-peak portion of the profile waveform which is continuous from the foot portion on the one side to be a convex portion, and that a portion of the sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the other side is a concave portion.

2. (Currently Amended) A method of determining the concavity and convexity on a sample, comprising the steps of:

scanning a portion of a sample including a concave pattern formed thereon with a charged particle beam; and

forming a profile waveform based on a charged particle emitted from ~~a location~~ ~~of said sample that has been~~ the scanned portion of the sample;

detecting a peak in the formed profile waveform;

comparing a convergence of a foot portion of each peak on either side thereof in the detected profile waveform;

determining when the ~~said profile waveform comprising a peak, wherein, when~~ ~~one~~ foot portion on one side of said peak converges more steeply than the other foot portion ~~thereof~~ on the other side, that a portion of said sample corresponding to ~~said~~ ~~one foot portion is determined to be~~ a non-peak portion of the profile waveform which is continuous from the foot portion on the one side is a concave portion, and that a portion of the sample corresponding to a non-peak portion of the profile waveform which is continuous from the foot portion on the other side is a convex portion.

3. (Original) The method of determining the concavity and convexity on a sample according to claim 1 or 2, wherein the charged particle beam is incident on the plane of a substrate perpendicularly.

4. (Original) The method of determining the concavity and convexity on a sample according to claim 3, wherein said profile waveform is created based on a charged particle emitted from a location of said sample that has been scanned as the charged particle beam that is perpendicularly incident on the sample is scanned by a scanning deflector.

5. (Original) The pattern position detection method according to claim 1 or 2, wherein the position of a pattern on said sample is identified based on the information about the concave and/or convex portions that have been determined.

6. (Original) The pattern position detection method according to claim 1 or 2, wherein a convex-concave pattern formed on a substrate is scanned by a charged particle beam, a profile waveform is created based on a reflected or secondary charged particle emitted from a scanned location, and a specific position of said pattern on said substrate is detected based on pattern convex-concave information obtained by said method of determining the concavity and convexity on a sample.

7. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with concavity-convexity information about a pre-registered model, in order to detect a specific position on said pattern on said sample.

8. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with the profile shape of a pre-registered model, and an error is detected if an evaluation value indicating the difference in their profile shapes exceeds a predetermined value.

9. (Original) The pattern position detection method according to claim 6, wherein a comparison is made with the number of edges in a pre-registered model, and an error is detected if the numbers of edges exceed a predetermined value.

10. (Currently Amended) A method of determining the concavity and convexity on a sample, comprising the steps of:

scanning a portion of a sample comprising a convex and/or concave pattern formed thereon with a charged particle beam[[,]]:

forming a profile waveform based on a charged particle emitted from [[a]] the scanned ~~location~~ portion of the sample; [[, and]]

forming a differentiated waveform of said profile waveform;[[,]]

~~said differentiated waveform having at least two peaks, wherein a portion of said sample corresponding to a longer interval between the position of one of the peaks and a point where the differentiated waveform becomes zero or converges is determined to be a convex portion, and a portion of said sample corresponding to a shorter interval is determined to be a concave portion~~

detecting a pair of continuous positive and negative peaks in the differentiated waveform;

determining, when, for each pair of the continuous positive and negative peaks in the detected differentiated waveform, the interval in a negative peak between a peak position and a position where the differentiated waveform reaches zero or converges is longer than the same interval in a positive peak, that a portion of the sample that corresponds to a non-peak portion of the differentiated waveform where the positive peak converges is a concave portion, and that a portion on the sample that corresponds to a non-peak portion of the differentiated waveform where a negative peak converges is a convex portion relative to the concave portion.

11. (Currently Amended) A charged particle beam apparatus comprising:

a charged particle source,

a scanning deflector for scanning a charged particle beam emitted by said charged particle source, [[and]]

a detector for detecting a charged particle emitted by a sample irradiated by said

charged particle beam, ~~wherein the improvement comprises~~ and

a control processor <u>that comprises:</u>

<u>a peak detecting means</u> for forming a profile waveform ~~comprising a peak~~

based on the detected charged particle <u>and detecting a peak in the formed profile</u>

<u>waveform;</u> ~~; wherein, when one~~

<u>a comparison means for comparing a convergence of a</u> foot portion <u>of</u>

<u>each peak on either side thereof in the detected profile waveform; and</u> ~~of said~~

~~peak converges more gradually than the other foot portion thereof, a portion of~~

~~said sample corresponding to said one foot portion is determined by said control~~

~~processor to be a convex portion~~

<u>a determination means that determines, based on the result of comparison</u>

<u>made by the comparing means, when the foot portion on one side converges</u>

<u>more gradually than the foot portion on the other side, that a portion of the</u>

<u>sample corresponding to a non-peak portion of a differentiated waveform which</u>

<u>is continuous from the foot portion on the one side is a convex portion, and that</u>

<u>a portion of the sample corresponding to a non-peak portion of the differentiated</u>

<u>waveform which is continuous from the foot portion on the other side is a</u>

<u>concave portion relative to the convex portion.</u>